

the 6th. A report from Eola, Oregon, stated that the drought continued during the month.

○ PRAIRIE AND FOREST FIRES.

Prairie fires caused considerable damage near East Portland, Oregon. In the region about Etta Mine, southwest South Dakota, and Bismarck, central North Dakota, forest fires caused widespread damage. In California forest fires raged during a great part of the month in the southern part of Humboldt and the upper part of Mendocino counties. Forest fires were reported at Grant's Pass, southwest Oregon, and in central and west-central Washington.

○ SUN SPOTS.

Mr. D. E. Hadden, Alta, Iowa: 1st, 2 groups, one new. 2d to 5th, one group, 2 spots. 6th, cloudy. 7th, one group, 3 spots; faculæ near east limb. 8th, one group, 4 spots; one large spot on east limb, surrounded by faculæ; one faint spot, south, surrounded by faculæ. 9th, one group, 2 spots. 10th, one group, 3 spots. 11th and 12th, cloudy. 13th, clear disc. 14th, cloudy. 15th, group of faculæ near northwest limb. 16th, one spot surrounded by faculæ. 17th, 2 groups, 4 spots; new group in south latitude. 18th and 19th, 2 groups, 5 spots. 20th, one group, 2 spots. 21st, one group of faculæ, southwest. 22d, group of faculæ near east and west limbs. 24th, one group, 2 spots; group near west limbs, with faculæ. 25th, one group, 4 spots. 26th and 27th, one group, 5 spots. 28th, one group, 4 spots. 29th, one group, 4 spots; one veiled spot. 30th, one group, 3 spots.

Mr. C. E. Buzzell, Leaf River, Ill.: the group of August 25th in view 1st and 2d. 3d to 5th, cloudy. 1st, new group three days in, in view 6th and 7th. 8th, clouds. 6th, 1 small group two days in, in view 9th, 10th, and 11th. New small group two days in, on 11th. Clouds, 12th. Clear disc 13th and 14th. Clouds, 15th. 16th, 2 groups one and two days in, in view 18th and 19th, both vanished on 20th. 21st, prominent faculæ on east limb, which changed to spots on 24th; they were unchanged on 29th. Clouds on 30th.

Mr. John W. James, Riley, Ill.: 1st, the group first seen August 26th, on sun's meridian. 6th, the largest spot close to

western edge of disc, the rest broken up; very prominent faculæ in their place; a few groups formed since yesterday two days from the western edge, disappeared by solar rotation 8th. 10th to 16th, none seen. 17th, 3 small groups in very low south latitude; gone 21st. The faculæ reappeared by solar rotation, 20th, but the large spots gone. 21st to 23d, none seen. 24th, 2 new groups three days east of sun's meridian. 30th, another new group formed 24 hours west of these new groups.

Mr. H. D. Govey, North Lewisburgh, Ohio: sun spots were observed 1st to 8th, 16th to 20th, 23d, 24th, 28th, and 29th.

Haverford College Observatory, Pa., (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculæ.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.		
Sept., 1890.										
1, 3 p. m.	0	14	0	0	0	0	2	65	1	Definition poor; 3 large spots.
2, 10 a. m.	0	0	0	0	0	0	2	59	1	Definition fair; 2 large spots.
3, 9 a. m.	0	0	0	0	0	0	2	54	2	Definition fair; 2 large spots.
4, 10 a. m.	1	7	0	0	0	0	3	52	1	Definition good; 1 large spot.
6, 5 p. m.	4	18	0	0	0	0	5	37	5	Definition good; 1 large spot.
7, 4 p. m.	0	12	1	1	0	0	4	44	8	Definition fair; 1 large spot.
8, 10 a. m.	0	0	0	0	0	0	4	20	4	Definition poor; 1 large spot.
9, 3 p. m.	0	22	0	7	0	0	4	34	2	Definition fair.
10, 11 a. m.	1	4	1	2	0	0	2	34	0	Definition fair; spots small.
12, 11 a. m.	1	5	0	0	0	0	2	25	0	Definition poor.
13, 10 a. m.	0	0	0	0	1	2	1	6	1	Definition fair.
15, 3 p. m.	1	2	0	0	0	0	1	2	5	Definition poor; 1 very large spot.
17, 12 m.	1	15	0	0	0	0	2	17	1	Definition fair; 2 very large spots.
18, 11 a. m.	0	11	0	0	0	0	2	28	1	Definition fair; 2 very large spots.
19, 12 m.	1	10	0	0	0	0	3	35	3	Definition fine; small.
20, 10 a. m.	0	0	0	0	0	0	1	7	2	Definition fair.
21, 3 p. m.	1	1	0	0	0	0	2	4	1	Definition fair.
23, 11 a. m.	1	19	1	0	1	3	24	5	Definition fine; very small.
24, 10 a. m.	0	0	0	0	0	0	1	13	3	Definition fair.
25, 12 m.	0	11	0	0	0	0	1	30	4	Definition good.
28, 4 p. m.	0	7	0	0	0	0	1	37	2	Definition fair; small.
29, 10 a. m.	0	0	0	0	0	0	1	17	2	Definition poor.
30, 10 a. m.	0	0	0	0	0	0	1	23	0	Definition poor.

○ VERIFICATIONS.

○ CAUTIONARY SIGNALS FOR SEPTEMBER, 1890.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

Statement showing percentages of justifications of wind signals for the month of September, 1890:

Wind signals.—(Ordered by 1st Lieut. R. E. Thompson). Total number of signals ordered, 45; justified as to velocity, wholly, 30, partly, 3; justified as to direction, 44. All of the signals ordered were cautionary; 20 signals were ordered for easterly winds, of which 19 were justified, and 25 were ordered for westerly winds, all of which were justified. Percentage of justifications, 58.5.

No cold-wave signals were ordered during the month.

○ FORECASTS FOR 24 HOURS IN ADVANCE.

The forecasts for districts east of the Rocky Mountains for September, 1890, were made by 1st Lieut. Richard E. Thompson, 6th Infantry, Signal Officer, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant John P. Finley, Signal Corps.

Percentages of forecasts verified, September, 1890.

States.	States.
Maine..... 80.7	Rhode Island..... 77.7
New Hampshire..... 79.8	Connecticut..... 77.2
Vermont..... 80.8	Eastern New York..... 80.5
Massachusetts..... 77.3	Western New York..... 82.9

Percentages of forecasts verified—Continued.

States.	States.
Eastern Pennsylvania..... 81.5	Illinois..... 74.7
Western Pennsylvania..... 79.9	Lower Michigan..... 82.6
New Jersey..... 75.3	Upper Michigan..... 80.2
Delaware..... 76.1	Wisconsin..... 83.3
Maryland..... 81.5	Minnesota..... 83.5
District of Columbia..... 82.7	Iowa..... 82.9
Virginia..... 81.0	Kansas..... 77.5
North Carolina..... 81.4	Nebraska..... 83.8
South Carolina..... 76.7	Missouri..... 78.1
Georgia..... 70.6	Colorado..... 81.9
Eastern Florida..... 82.9	North Dakota..... 82.1
Western Florida..... 83.2	South Dakota..... 83.1
Alabama..... 77.7	Southern California*..... 87.9
Mississippi..... 75.9	Northern California*..... 85.8
Louisiana..... 75.4	Oregon*..... 88.3
Texas..... 82.1	Washington*..... 87.9
Arkansas..... 72.9	By elements: Weather..... 83.0
Tennessee..... 72.8	Temperature..... 73.9
Kentucky..... 76.7	Monthly percentage of weather and temperature combined..... 79.4
Ohio..... 81.0	
West Virginia..... 80.0	
Indiana..... 74.3	

* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The forecasts of temperature in districts east of the Rocky Mountains for September, 1890, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. ‡ The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

○ FORECASTS FOR 48 HOURS IN ADVANCE.

Appreciating the great importance that long time predic-

tions possess for the general public the Chief Signal Officer has authorized forecasts for 48 and 72 hours, covering the 2d and 3d days in advance. These are optional with the forecast official, and are only made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 111; temperature, 104. Percentages of verifications: weather, 75.8; temperature, 81.2; weather and temperature combined, 77.8. No forecasts for 72 hours were made during the month.

Percentages of verifications of weather and temperature signals reported by directors of the various State Weather Services for September, 1890.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Iowa.....	90.0	90.0	Nebraska.....	86.8	91.4
Louisiana, northern.....	55.0	76.0	New Jersey.....	83.4	88.9
Louisiana, southern.....	100.0	88.0	North and South Dakota.....	92.0	92.0
Michigan.....	86.5	85.6	Ohio.....	89.0	88.0
Minnesota.....	75.0	71.0	Pennsylvania.....	88.0	90.0
Missouri.....	84.0	83.0	South Carolina.....	76.1	81.3

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for September, 1890, of the directors of the various state weather services:

ALABAMA.

The continued wet weather greatly damaged the cotton crop.

Temperature.—Maximum, 97, at Pine Apple, 10th, and at Union Springs, 19th, 20th, and 21st; minimum, 50, at Florence, 28th, and at Valley Head, 17th and 18th; greatest local monthly range, 45, at Union Springs.

Precipitation.—Greatest monthly, 10.07, at Valley Head; least monthly, 8.08, at Goodwater.

Wind.—Prevailing direction, east.—Prof. P. H. Mell, Auburn, director; J. M. Quarles, Private, Signal Corps, assistant.

ARKANSAS.

The month was characterized by unusually heavy rainfall.

Temperature.—Maximum, 98, at Lead Hill, 7th; minimum, 42, at Winslow, 29th; greatest local monthly range, 52, at Lead Hill; least local monthly range, 32, at Malvern.

Precipitation.—Greatest monthly, 12.62, at Hot Springs; least monthly, 0.81, at Malvern.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Sergeant, Signal Corps, assistant.

COLORADO.

Temperature.—The mean was 2.5 above the average of the last 4 years; maximum, 100, at Bennet, 1st; minimum, 7, at Climax, 26th; greatest local monthly range, 72, at Breckenridge; least local monthly range, 27, at Kit Carson.

Precipitation.—The rainfall ranged from 2.32, at Climax, to 0.00, at many stations.

Wind.—Prevailing direction, west.—Prof. F. H. Loud, Colorado Springs, director; W. S. Miller, Sergeant, Signal Corps, assistant.

ILLINOIS.

Temperature.—The mean was 3.2 below the normal of the last 15 years; maximum, 96, at East Peoria, 6th; minimum, 30, at Sycamore, 20th, and at Philo and Pontiac, 28th.

Precipitation.—The average was 0.43 below the normal of the last 12 years; greatest monthly, 6.32, at Centralia; least monthly, 0.35, at Pontiac.

Wind.—Prevailing direction, northeast.—John Craig, Sergeant, Signal Corps, Springfield, in charge.

INDIANA.

Temperature.—The average was 2.0 below the normal; maximum, 92, at Huntingburgh and Princeton, 4th, 5th, and 7th; minimum, 31, at Point Isabel, 29th; greatest monthly range, 55, at Delphi and Logansport; least monthly range, 44, at Butlerville and DeGonia Springs.

Precipitation.—The average was 1.04 in excess of the normal; greatest monthly, 9.02, at Farmland; least monthly, 2.07, at Seymour.

Wind.—Prevailing direction, northeast.—Prof. H. A. Huston, La Fayette, director; H. R. Patrick, Private, Signal Corps, assistant.

IOWA WEATHER AND CROP SERVICE.

Temperature.—The average was about 2.5 below the normal; maximum, 96, at Carson, 6th; minimum, 23, at Atlantic, 13th; greatest monthly range, 71, at Atlantic; least monthly range, 41, at Independence.

Precipitation.—There was an average deficiency of about 1.00; greatest monthly, 4.85, at Eagle Grove; least monthly, 1.86, at Carroll.

Wind.—Prevailing direction, south.—J. R. Sage, Des Moines, director; G. M. Chappel, Sergeant, Signal Corps, assistant.

KANSAS.

Temperature.—The temperature was normal in the northern and western parts of Gove, the eastern and southern portions of Logan, and the northern portion of Scott, Wichita, and Greeley counties, while a deficiency existed throughout the rest of the state, which increased eastward until it culminated in an area extending from Dickinson, Geary, and Riley southeastward down the Neosho Valley to Bourbon, Neosho, and Wilson, in which area the temperature was 4 below normal: maximum, 106, at Gove City, 1st, and at Page City, 2d and 3d; minimum, 20, at Lakin, 18th, and at Luray, 19th; greatest

local monthly range, 83, at Lakin; least local monthly range, 48, at Weskan and Abilene.

Precipitation.—Greatest monthly, 6.62, at Horton; least monthly, 0.20, at Wallace and McAllister.

Wind.—Prevailing direction, south.—Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.

KENTUCKY.

Temperature.—The average was about 2 below the normal; maximum, 95, at Harrodsburgh, 7th; minimum, 86, at Central City, 28th; greatest monthly range, 57, at Harrodsburgh; least monthly range, 38, at Edmonton.

Precipitation.—The rainfall was well distributed over the state and was about normal in amount; greatest monthly, 5.34, at Edmonton; least monthly, 1.65, at Frankfort.

Wind.—Prevailing direction, northeast.—Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.

LOUISIANA.

Temperature.—The mean was 1.7 below the normal for the state, being somewhat greater in the southern portion than in the northern; maximum, 100, at Cameron, 6th; minimum, 41, at Maurepas, 30th; greatest local monthly range, 58, at Minden; least monthly range, 38, at Edgard and New Orleans.

Precipitation.—The average was 0.40 above the normal for the northern, and 0.75 below for the southern section; greatest monthly, 10.68, at Minden; least monthly, 0.87, at Mandeville.

Wind.—Prevailing direction, south and southeast.—George E. Hunt, Sergeant, Signal Corps, New Orleans, in charge.

MICHIGAN.

The notable features of the month were the low temperature of the last week, and the light and unevenly distributed rainfall.

Temperature.—The mean was 3.5 below the normal of 15 years; maximum, 94, at Alma, 3d; minimum, 19, at Roscommon, 28th; greatest monthly range, 69, at Grayling; least monthly range, 34, at Atlantic.

Precipitation.—The average was 1.11 below the normal for 15 years; in Cass, Berrien, Calhoun, Delta, south Van Buren, a part of Branch, and Saint Joseph and Kalamazoo counties the rainfall was above the normal; greatest monthly, 5.26, at Vandalia; least monthly, 0.21, at Standish.

Wind.—Prevailing direction, northeast.—N. B. Conger, Sergeant, Signal Corps, Lansing, director.

MINNESOTA.

Temperature.—The month was generally less than 1 cooler than usual; maximum, 89, at Grand Meadow, 6th; minimum, 24, at Pokegama Falls, 16th and 27th, and at Medford, 28th; greatest local monthly range, 68, at Medford; least local monthly range, 46, at Duluth.

Precipitation.—The rainfall was in excess 2.02 at Saint Vincent and 0.52 at Moorhead, while at Saint Paul and Duluth it was deficient 0.65 and 2.14, respectively; greatest monthly, 4.74, at Lake Winnibigoshish Dam; least monthly, 1.06, at Morris.

Wind.—Prevailing direction, south.—John Healy, Corporal, Signal Corps, Saint Paul, in charge.

MISSISSIPPI.

Temperature.—The deficiency in temperature was greatest in the northern part of the state. The temperature generally remained above the normal during the first half of the month, and there was then a gradual fall to the lowest on the 29th and 30th; maximum, 98, at Vaiden, 10th; minimum, 40, at Macon, 28th; greatest local monthly range, 50, at Macon.

Precipitation.—There was an excess of precipitation in the northern half of the state amounting to several inches, and a deficiency of from 1.00 to 2.00 in the southern portion; greatest monthly, 13.07, at Corinth; least monthly, 1.80, at Bay Saint Louis.—R. B. Fulton, Signal Corps, University, director.

MISSOURI.

Temperature.—The mean was 3.8 below the normal; maximum, 98, at Protem; minimum, 34, at Miami.